

1. Specify: X Agricultural project Urban Individual application Joint application
2. Installation, Operation and Agronomic Training of sub-surface drip irrigation in 1000 acres of asparagus to partially address CALFED Quantifiable Objectives 75, 88 and 89. This project would also address Priority outcomes 78,79, 80, 81 and 82. (Sacramento River, San Joaquin River and the Delta).
3. Golden State Irrigation Services, Inc. 1648 N. Shaw Road, Stockton, CA 95215
4. Mike Conrad, Executive Vice President
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8. mconrad@goldenstateirr.com
9. Funds requested-dollar amount \$898,500.00
10. Applicant cost share funds pledged-dollar amount \$1,502,000.00
11. Duration 6/01/01-6/01/04
12. State Assembly #17, Senate District #5, Congressional District #11
13. Location and geographic boundaries of the project: San Joaquin and Delta Regions
14. Name and signature of official representing applicant. By signing below, the applicant declares the following – the truthfulness of all representations in the proposal;
- The individual signing the form is authorized to submit the application on behalf of the applicant;
 - The applicant will comply with contract terms and conditions identified in Section 11 of this PSP.

(signature of applicant)

(date) _____

(print name of applicant)

A) SCOPE OF WORK
Relevance and Importance

1. This project will install sub-surface drip irrigation systems to help reduce pumping and siphon flows. This project will reduce irrigation water losses from evaporation partially addressing Quantifiable Objective 75, 88 and 89 by reducing flows and increasing the water supply. Additional benefits would include the substantial reduction of pesticide, fertilizer and other organic contamination of the river and Delta by eliminating tail water pumping, which address Priority Outcomes 78,79, 80,81 and 82.
2. This project will allow growers to irrigate in a manner that delivers more precise water, and nutrient amounts to the crop below the soil surface in a delivery system that will exceed 90% efficiency. This resulting increase in accuracy will result in smaller amounts of water to be taken from the river on a daily basis and eliminate irrigation losses due to evaporation. The installation of a sub-surface drip irrigation system will result in the elimination of surface irrigation water, which in turn eliminates irrigation (tail water) return systems that are often contaminated with fertilizers, herbicides and pesticides. The reduction the amounts of unrecoverable water losses due to evaporation will be a benefit.

This project will add flow to the river as required in CALFED Quantifiable Objective 75 and 89. This project will also decrease nonproductive ET, which will increase the water supply for beneficial uses as required in CALFED Quantifiable Objective 88.

This project will also positively effect Priority Outcomes 78, 79, 80, 81 and 82 by the reduction of fertilizer, herbicide and pesticide applications through accuracy of application and training of proper methods of application through the sub-surface drip system.

3. This proposal would replace inefficient, aging irrigation pumping plants, earthen irrigation ditches and century old methods with smaller more efficient pumping plants, buried PVC pipelines, sub-surface drip emission devices, and new technology transfer that will allow the grower to reduce the total amounts of water and fertilizer applied to his crop while offering him a potentially higher yield. This project will take approximately 1000 acres of currently surface irrigated row crop ground and install sub-surface drip irrigation with an objective of using the least amount of inputs to reach a maximum yield. Current methods require large water flows that place the irrigation water in contact with the soil surface and increase the surface area of the water, which substantially increases the unrecoverable losses from evaporation. These sub-surface drip irrigation systems would work to help in the reduction of both of these CALFED Quantifiable losses addressed in 75, 88 and 89.

A minimum of four different farms would receive irrigation systems. The project sizes would range from 150 acres to 300 acres per grower. An on site agronomist would schedule the irrigation timing and fertilizer timing. The application schedule would be implemented to reduce losses and overuse. System design would include weather stations, CIMIS information, and leaf and petiole analysis. Growers would designate a field attendant to work with the agronomist to learn the correct operation of the system.

Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

4) Hypothetical Evaporation Losses for Flood Irrigation System in Asparagus.

Asparagus is irrigated an average of 5 to 6 times per year in the Delta region. Normal irrigation practices are flood / furrow irrigation. These furrows cover approximately 50% of the soil surface. Each irrigation cycle keeps the water in these furrows for approximately 24 hours. Normal months of irrigations, average daily Evapo-transpiration and approximate water savings are as follows:

May	Average Eto .22" / day
June	Average Eto .27" / day
July	Average Eto .28" / day
August	Average Eto .23" / day
September	Average Eto .16" / day
October	Average Eto .09" / day
Total Water Savings	1.25 acre feet /acre /season 1250 acre feet / year

These water savings will go to increasing the water supply for the Delta and Sacramento River as specified in CALFED Quantifiable Objective 75,79 and 88.

The technique of furrow irrigation, is such that the system is operated in a manner that applies more water to the field than will go into the soil. It is a basic requirement for even minimal efficiencies that excess water be introduced to the field. Even the best leveled field with excellent operation and control will exhibit over saturation in certain areas. Without this method of operation, uniformities of irrigation would be non-existent. A furrow irrigation system when operated on ground that is leveled correctly, irrigated by someone with many years of experience could potentially have a fairly high uniformity (60-70%). It is impossible to achieve any uniformity without over irrigation and tail water.

This proposal is to replace this cumbersome, inefficient ditch, furrow and flood systems with a system with high uniformity and greater ease of operation. When this is accomplished the following will occur:

Average Eto for a summer month for asparagus is 5.2". Irrigating 1000 acres of asparagus with a fairly uniform furrow irrigation system requires the irrigator to over pump into the field.

$(1000 \text{ acres} \times 5.2 \text{ acre inches} \times 27154 \text{ gallons per acre inch} \times 25\% \text{ Loss}) / 325,851 \text{ gallons / acre-feet} = 108 \text{ acre-feet of water (minus evaporation losses).}$

These 108 acre-feet of water (the tail water) are returned to the river by a return pump. This tail water contains the left over residue of any fertilizers or pesticides from the soil surface and excesses that would be leached from the soil. Sub-surface irrigation systems have zero water being returned to the river ecosystem. All water and fertilizer delivered to the field remain in the field. This would positively affect Priority Outcomes 78, 79, 80,81 and 82.

5) Schedule

Tasks	Due date
Contact and secure cooperators	May 15, 2001
Engineering, design and estimate	June 1, 2001
Appoint Agronomist/Irrigation Specialist	June 1, 2001
Review and finalize proposal w/growers	July 15, 2001
Deliver Irrigation Equipment	September 1, 2001
Install Subsurface Hose	September 15, 2001
Install PVC Pipe and Filters	October 15, 2001
Install Balance of Equipment	November 15, 2001
Install Weather Station	March 1, 2002
Start-up and Operate	March 1, 2002
Training	March 1, 2002
Follow Up and Monitoring	March 1, 2002- 2005

6) Monitoring and Assessment

One of the most important aspects of this project will be the training and the field knowledge gained and distributed by the agronomist that will operate these projects. Our goal will be to train an agronomist that is not only knowledgeable on what nutrients and water amounts that crops use but just as importantly how they are delivered to the crop and how these different delivery systems effect other aspects of the fields and surrounding areas.

Progress will be monitored by using two adjacent asparagus fields irrigated under current furrow irrigation practices and using them as control fields to measure the success of the sub-surface irrigation system.

Irrigation days and the amounts of water and fertilizers used will be compared from these different fields. The level of crop production will be compared to the amount of inputs that are used.

Each field will be set up as a separate operation for budgeting of costs, inputs, maintenance, labor etc. as a separate economic unit updated weekly. Production levels, quality, and relative costs of harvest and logistics of harvest will be quantified and commented upon. The design, installation, maintenance and operation of the irrigation equipment will be reviewed from the standpoint of design vs. actual performance. Periodic meetings and an evaluation team will be set up with Golden State accounting staff, farm bookkeeper, farm manager, project leader and agronomist. Golden State will update our website with results quarterly, Golden State's agronomists and project leader will schedule talks and disseminate data to all appropriate farm and commodity groups.

B) OUTREACH, COMMUNITY INVOLVEMENT AND INFORMATION TRANSFER

1) High priority will be given to an agronomist / irrigation specialist with minority status. A summer internship will be provided to a qualified student from the University of California System.

2) Each farm will have one employee that will be trained in the correct use and the maintenance of sub-surface irrigation and weather stations. This knowledge can be transferred to other crops and irrigation systems. Each farm will provide a bookkeeper that will be trained in conservation economics.

The agronomist / irrigation specialist will undergo training that will allow him to teach others the correct use of these systems and to impart how this training can be adapted for other uses. Golden State will provide instruction and training manual.

3) Disseminating the information and promoting their application from this project will be through our current contacts in the Farm Bureau, Academia and local, regional and trade publications. We will be available for talks, private meetings and through our web site.

C) QUALIFICATIONS OF THE APPLICANTS, COOPERATORS AND ESTABLISHMENT OF PARTNERSHIPS

Michael E. Conrad 4990 St. Andrews Drive, Stockton, CA 95219

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Education	1975 - 1978	Stanislaus State University	Turlock, California
	BA Biological Science		
Professional experience	1985 –Present	Golden State Irrigation Services Inc.	
	Executive Vice President		
	<ul style="list-style-type: none">Assisted in establishing a new Irrigation Company that currently has sales of over 20 million dollars.Responsible for the successful design, installation and operated in over 45,000 acres of low volume irrigation.Design Irrigation systems and operated in over forty different crops.Currently oversees 12 outside field personnel and 11 field installation crews in 5 branch stores.General Engineering Contractors LicenseCertified Irrigation Designer in low volume irrigation and flood irrigation.City of Stockton Recycling Board MemberSan Joaquin Co. Water Board MemberIrrigation Association Certification Board Member		
Professional memberships	California Irrigation Dealers Association Member		
	Irrigation Association Member		

2) External Cooperators

The growers that are currently farming asparagus under furrow irrigation methods.

D) COSTS AND BENEFITS

BUDGET SUMMARY FOR 1000 ACRES SUB-SURFACE DRIP IRRIGATION SYSTEM

Item	Amount	Units	Qty	Total Cost	Units	Life	Present Value	Local Share \$	CALFED request \$
A) Salaries and wages									
Maintenance									
Labor	5000	\$/yr	4	20,000	\$	3	20,000	16000	4000
Agronomist/Irrigation Specialist	65,000	\$/yr	1	65,000	\$	3	65,000		195,000
B) Fringe benefits									
	21,000	\$/yr	3	63,000	\$	3	63,000		63,000
C) Supplies									
In-field components									
Sub-surface drip, filters and pumping plant	1300	\$/acre	1000	1,300,000	\$	20	1,300,000	975,000	325,000
Weather station	15,000	\$/ea	4	60,000	\$	10	60,000	30,000	30,000
D) Equipment									
pick-up truck	23,000	\$/ea	1	23,000	\$	5	23,000	11,500	11,500
E) Services or consultants		none							
F) Travel									
Presentations of results and findings	5,000	\$/yr	4	20,000	\$		20,000	0	20,000
G) Other costs									
Engineering	40,000	\$/ea	1	40,000	\$	20	40,000	30,000	10,000
Planning	60,000	\$/ea	1	60,000	\$	20	60,000	40,000	20,000
Construction	500,000	\$/ea	1	500,000	\$	20	500,000	400,000	100,000
Agronomist expenses	40,000	\$/ea	3	120,000	\$	3	120,000		120,000
H) Total estimated costs (a through g)							2,271,000	1,502,000	898,500

2) Budget Justification

- a) Salaries and Wages: Maintenance Labor will be used for annual cleaning and servicing of all major components. Agronomist/ Irrigation Specialist will be the lead person on controlling/advising the inputs, recording this information for the sub-surface system and the furrow system, and publishing this information.
- b) The fringe benefits would include health insurance, vacation pay, retirement benefits and education for the agronomist.
- c) Supplies would comprise of all the below ground pipe and tubing, filtration system, fertilizer injection system, pumping and electrical plants. The weather stations would be located in each field that is supplied with a drip system and in the two control fields. They would record weather information and be used to schedule irrigations.
- d) Equipment purchases would consist of a pick-up truck to travel to the job sites and meetings and a lap top computer to record information.
- e) Travel expenses would consist of local travel by the agronomist to various sites to deliver presentations to interested parties.
- f) Engineering costs are the costs associated with the survey, design and fieldwork needed for a complete working irrigation system?
- g) Planning costs would include all work done to get the plans to the growers for their approval and all associated costs with implementing the plan prior to commencing construction.
- h) Construction costs would include all labor and equipment costs associated with getting the systems up and operational. This would include the trenching, electrical labor and pipeline labor needed.
- i) Agronomist expenses would include fuel, vehicle repairs and maintenance, office expense and other overhead costs.

3) Benefit Summary and Breakdown

The benefits to the Delta and Sacramento River are the increased water flow that will be kept in the system and not lost to evaporation and the minimization of organic and inorganic contaminants put back into the river from the necessary tail-water return system that furrow and flood irrigation systems require. The sub-surface irrigation system will result in conservation of water, labor and energy while increasing crop production.

The information transfer that will be gained by having a trained agronomist will allow growers to make wise decisions on how to spend money for increased yields. If growers are shown that they can profitably grow crops with fewer inputs than previously used, they will be able and willing to make changes.

The ultimate goal for the grower has to be to grow the most crops with the least inputs necessary while still remaining profitable. The sub-surface drip system has the potential to increase the grower's yield but the learning curve is steep. Most current irrigation practices used require a less educated work force for successful irrigation. The sub-surface drip system will require training and follow up for its successful implementation. The success of these systems will help growers make the decisions necessary when evaluating the advantages of installing sub-surface drip systems.

4) Assessments of Costs and Benefits

- a) No major assumptions were made.

SUMMARY OF QUANTIFIED AND NON-QUANTIFIED COSTS AND BENEFITS

Item	Amount	Units	Qty	Total Cost	Units	Life	Present Value	Beneficiary
A) Salaries and Wages								
Maintenance								
Labor	5000	\$/yr	4	20,000	\$	3	20,000	n/a
Agronomist/Irrigation Specialist	65,000	\$/yr	1	65,000	\$	3	65,000	n/a
B) Fringe Benefits	21,000	\$/yr	3	63,000	\$	3	63,000	n/a
C) Supplies								
In-field components								
Sub-surface drip, filters and pumping plant	1300	\$/acre	1000	1,300,000	\$	20	1,300,000	n/a
Weather station	15,000	\$/ea	4	60,000	\$	10	60,000	n/a
D) Equipment								
Pick-up truck	23,000	\$/ea	1	23,000	\$	5	23,000	n/a
Lap top computer	4500	\$/ea	1	4500	\$	5	4500	n/a
E) Services or Consultants		none						
F) Travel								
Presentations of results and findings	5,000	\$/yr	4	20,000	\$		20,000	n/a
G) Other Costs								
Engineering	40,000	\$/ea	1	40,000	\$	20	40,000	n/a
Planning	60,000	\$/ea	1	60,000	\$	20	60,000	n/a
Construction	500,000	\$/ea	1	500,000	\$	20	500,000	n/a
Agronomist Expenses	40,000	\$/ea	3	120,000	\$	3	120,000	n/a
H) Total estimated costs (A through G)							2,275,500	
Quantified Benefits								
Increased yield								farm operators
Reduced inputs-electrical, water, fertilizer								farm operators
pumping reduction								farm operators
Non-Quantified Costs								
none							n/a	n/a
Non-Quantified Benefits								
Immature fish hatchling death reduction/fewer gallons pumped smaller pumps								
River Diversion reduction							1250 Acre/ft	CALFED 75&88
Reduce Tail-water Pumping and Contamination							108 Acre/ft	CALFFED 80,81 82
Analysis Assumptions								
Discount Rate 6%								

